sample points of a given spectrum (although the spectra of the three targets will still be viwed and handled sequentially) to therefore provied a more rapid readout.

Illustrated in FIG. **3** are the diffusing sphere **26,** polychrometer **64** and vidicon sensor **66** arranged for practice of a preferred form of the present invention. The diffusing sphere has an input port **25** arranged to receive radiant energy from a polychromatic lamp source **24.** As an example, a tungsten lamp may be used for illumination of the integrating sphere and a filter (not shown) is interposed between the lamp and the sphere to provide illumination conforming to CIE (Commission International de L'Eclarage) specifications for source A, C and D6500. Light from the diffusing sphere is projected through its exit port **36** to the polychrometer where it falls upon an entrance slit. Light passed by the slit is focused by a collimating lens **68** and mirror **70** upon a dispersing grating **72.** The spectrum of dispersed light is reflected from the grating and focused by means of a lens **73** and reflecting mirror **74** upon the face **76** of the vidicon sensor tube **66.**

The entrance slit of the polychrometer and the grating are arranged to present the spectrum of the light beam that is received at the entrance slit over the optical spectral interval of 400 to 700 nanometers so as to cover a region of 0.500 inches in length and 0.187 inches in height, substantially centered on the face of the sensor tube. Although many types of imaging tubes may be used for the sensor, the exemplary vidicon sensor employs an RCA 4532 magnetic focus and deflection vidicon tube having a silicon diode array target structure. The physical nature of the diode array in this vidicon tube is such that there are 300 scan intervals over a distance of 0.500 inches on the face of the tube. Accordingly, there is one scan interval for each nanometer in the imaged spectrum. Further details of the nature and application of the scanning of the vidicon tube will be described below in connection with FIG. **7.**

As shown in FIGS. **4, 5** and **6,** the diffusing sphere **26** is made in two parts, **27** and **29,** suitably secured to each other by screws (not shown) so as to provide a rigid integral interior spherical cavity. The sphere is provided with three target ports. A sample **78** of which a color is to be measured is detachably secured to the first target port **80** as by a clamping spring **82.** A white standard **84,** which is not changed as frequently as the color sample, is detachably secured to a second target port **86** by means of one or more screws and clamping structures **88.** A black body cavity **90** is fixed to a third target port **92** and comprises an angulated energy receiving and trapping path of which the walls are coated with light-absorbent and nonreflective material.

Journaled in and coaxial with the entrance or input port **25** of the diffusing sphere **26** is a mirror support **94** (FIGS. **4, 6**) comprising a hub **96** having a portion extending externally of the sphere. Fixed to the externally extending hub portion by means of a key **93** and screw **95** is a mirror drive gear **98** carrying a spring-pressed ball detent **97** that cooperates with an annular plate **99** fixed to the sphere and having three circumferentially spaced recesses for respectively receiving the detent ball to precisely position the mirror support **94** for viewing the respectivve ports.

Also fixed to the hub **96** and extending inwardly of the sphere are a plurality of standards **100, 102** and **104** that carry a diffusing plate **106** formed of aluminum or other suitable materail, coated with a highly reflective coating. This coating may be the same as that employed on the inner surface of the diffusing sphere. Preferably, the diffusing plate and the entire inner surface of the diffusing sphere, except for the areas of the ports, are coated with a highly reflective paint, such as a white barium sulfate reflective paint.

The diffusing plate at the input port may be augmented by additional baffles (not shown) within the sphere to ensure that light from the tungsten source cannot reach the exit port without being reflected from one of three targets or from the interior surface of the sphere. Although the size may be readily varied, it is contemplated that a preferred diffusing sphere will have an 8-inch internal diameter and each of the target ports will have a diameter of about 1inche.

The three target ports are equally spaced around a great circle of the sphere **26** the lies in a plane normal to the axis of the input port **25** and normal to the axis of rotation of the mirror mounting assembly. The mirror mounting assembly is jounaled in the input port **25** by means of bearings **108** interposed between the inner neck of the port and the outer surface of the hub **96** of the mirror mounting assembly.

Fixed to the mirror support **94** is the port selecting mirror **110** having a reflective surface positioned at an angle of 45° with respect to the plane containing the great circle of the several ports and at an angle of 45° with respect to the axis of rotation of the mirror mounting assembly. Accordingly, the mirror may be moved to any one of three different positions in which it will be latched by detent means **97, 99** to receive light directed radially from the port being viewed at the given instant. The mirror will reflect such light along the axis of rotation of the mirror mounting assembly. This axis of rotation is coaxial with the input port **25** and is also coaxial with the exit port **36** of the sphere. A motor **112** and gear **114** are provied to drive the gear **98** and thus move the mirror among the three different pivotal positions thereof for selectively viewing one or the other of the three target ports. A lnes **116** is mounted within the input port and within the hollow hub of the mirror mounting assembly for directing light from the source **24** to and upon the diffusing plate. The latter is positioned and dimensioned so as to completely block the direct transmission of light from the input port **25** to the exit port **36** of the sphere. Accordingly, light entering the sphere is entirely reflected from the plate to and from the highly reflective surface of the sphere to provide a substantially uniform illumination of all of the target ports.

In a preferred arrangement, the exit port is provided with an adjustable focusing lens systems **118** having a focal point outside the polychrometer entrance slit. This arrangement enables the polychrometer to receive light reflected from a relatively small central portion of the target being viewed at any instant. The use of only a portion of the target helps to eliminate effects of stray light that may be reflected through the exit port from the mirror and which derives not from the target but from points in the sphere adjacent the target. The exit port lens system comprises the lens elements **118** fixed to a sleeve **120** slidable in the exit port and having an external threaded surface in engagement with an internally threaded adjusting nut **122** that is keyed to a circumferential groove in the exit port. An apertured ring